December 1, 2008

Re: Santee Cooper Response to SCDHEC November 25 Request for Information regarding the draft NOMA for the Proposed Pee Dee Generating Station

Please find below Santee Cooper's responses to the questions that DHEC has raised regarding the comments that the Southern Environmental Law Center et al submitted on the Notice of MACT Approval (NOMA) for the proposed Pee Dee Generating Station. To further supplement the answers below, where appropriate, Santee Cooper also is attaching earlier submissions made to the record that are responsive to the particular issue or concern raised by SELC.

(The numbers in brackets at the beginning of each item are page numbers in the SELC letter.) Parentheticals enumerate the bullets in the request from SCDHEC.

- **(1)** Provide data to support mercury formation and capture in CFB vs PC units, as described in the MACT application. Provide any other information as to why the mercury emissions are not comparable.

  As discussed at length in the case-by-case MACT application, Appendix B attached thereto, and in the supplemental responses referenced below, CFB and PC units are fundamentally different. The Clean Air Act (CAA or Act) requires that the case-by-case MACT determinations be based on the emission control that is achieved in practice by the best controlled similar source. EPA's regulations define "similar source" as meaning "a stationary source or process that has comparable emissions and is structurally similar in design and capacity to a constructed or reconstructed major source such that the source could be controlled using the same control technology." The MACT determination considered sources similar in design and capacity to the proposed Pee Dee generating units, i.e., PC units burning eastern bituminous coal. Contrary to the assertions of SELC, it is within DHEC's discretion to subcategorize based on fuel type and process type. Such an approach is consistent not only with national MACT standard-setting process for source categories, but also with the approach applied by EPA in the 2004 Utility MACT. Specifically, EPA in the 2004 Utility MACT proposal applied the same two technical criteria (i.e., fuel type and process type) in the subcategories for coal-fired electric utility source category.

  Moreover, it is clear from the ICR-3 data that mercury emissions differ by coal rank, and by combustion approach. With respect to combustion approach, we would draw attention to the discussion of this issue in the Santee Cooper application[1] and the documented difference in mercury emissions from CFB boilers versus Pulverized Coal boilers in Santee Cooper's response to Question #7 in an August 12, 2008 inquiry by DHEC.[2] Given the significant technological differences between PC and CFB units, units utilizing the latter technology were

[1] MACT Application p.18-20, and Appendix B.
[2] *Response to DHEC August 12, 2008 Inquiry: Question #7*, Santee Cooper.

appropriately excluded from the analysis and it is well within DHEC's discretion to do so.

SC Attachment 1a: *Discussion in application pp. 17-20 and Appendix B to the case-by-case MACT application (pages 62-65 of the document).*
SC Attachment 1b: *Response to DHEC August 12, 2008 Inquiry: Question #6*
SC Attachment 1c: *Response to DHEC August 12, 2008 Inquiry: Question #7*

- **(2)** [Pages 25-26] Provide design basis mercury content of each fuel proposed; Uncontrolled mercury emission rate; Design basis for the activated carbon system, including control efficiency and the basis for carbon injection rate used in the cost analysis.

  Santee Cooper plans to use Central Appalachian, Northern Appalachian and Illinois Basin coals as fuel for the proposed Pee Dee facility. Central Appalachian coal has a mean mercury content of 150 ppb, and Northern Appalachian coal has a mean mercury content of 240 ppb. Based on a heat input of 5700 mmBTU/hr and coal with an average heat content of 25 mmBTU/ton, each boiler at the Pee Dee facility would consume 228 tons of coal per hour. Illinois Basin coal has a mean mercury content of 100 ppb, a heat content of 23 mmBtu/ton, and would consume 248 tons of coal per hour. As such, the uncontrolled emission rates for Central and Northern Appalachian and Illinois Basin coals would be 0.068 lb/hr, 0.109 lb/hr, and 0.050 lb/hr, respectively, which correlates to uncontrolled lb/TW-hr emission rates of 118, 189, and 86. Thus, to reach the NOMA limit of 8 lb/TW-hr, using average mercury contents, the required emission reduction would range from 90.7% to 95.8% . ***See SC Attachment 2a and SC Attachment 2b.***

  The Pee Dee units will also burn limited amounts of petroleum coke, depending on the availability and the quality of the fuel. Notably, SELC has mistakenly claimed in its November 19, 2008 comments on the NOMA that petroleum coke contains no mercury and the MACT should reflect the use of this "mercury-free" fuel. To the contrary, petroleum coke does contain mercury. As reported by EPA, "[t]he amount of mercury in petroleum coke is known with some certainty . . . . The mean is approximately 50 ppb."[3] The range of concentrations of mercury in petroleum coke reported by EPA was 0-400 ppb.[4] For comparison, the EPA 1999 ICR-2 database of bituminous coals tested during that year ranged from an average of 89 ppb mercury for low sulfur bituminous coals, to 113 ppb mercury for bituminous coals not indicating the sulfur content. In short, there is no assurance that petroleum coke can be relied on as a fixed percentage of energy input to the Pee Dee units, and even if such a fixed percentage existed, there is no assurance that the petroleum coke would have a lower mercury content than the coal which would otherwise be burned in the unit.

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[3] *Mercury in Petroleum and Natural Gas: Estimation of Emissions From Production, Processing, and Combustion*, EPA/600/R-01/066 (Sept. 2001).
[4] *Id.*

The design basis for the ACI system is based on the uncontrolled mercury emission rate at the inlet to the fabric filter. Using mercury concentrations from 15 coals samples taken at the Cross and Winyah units from January 2008 through March 2008, the average uncontrolled emission rate was 71.4 lb Hg/ TW-hr, the magnitude of which is consistent with the Central Appalachian coal data from USGS. Using this design mercury inlet rate with bituminous coal, Siemens (Wheelabrator) recommended an ACI injection rate of 5-10 lb carbon per MMacf flue gas to produce a 90% removal rate from uncontrolled mercury levels. However, vendors have not provided a guarantee for the incremental reductions after mercury controls achieved by SCR/FF/WFGD configuration. This means that there is no assurance that ACI would ever achieve incremental mercury reductions anywhere near 90% control. Such incremental mercury controls are not achievable due to the very low mercury emissions levels already being achieved and given that these residual mercury emissions are the hardest-to-control fraction of the mercury emissions in the flue gas stream.

Finally the cost calculations for the beyond-the-floor analysis assumed that the injection rate was 7.5 lb/MMacf, resulting in an injection rate of 990 lb/hr at 2,200,000 acfm. Also of note is that Santee Cooper's application for the case-by-case MACT assumed 100% incremental control for ACI in the beyond-the-floor analysis for mercury. Even with this unrealistic assumption the cost effectiveness of ACI was too high to be acceptable as a beyond-the-floor technology and therefore to be cost prohibitive

The lowered mercury emission rate limit in the NOMA directly results in the requirements to both obtain high mercury removal rates and to limit fuel flexibility to be able to demonstrate compliance.

- **(3)** [pages 26-28] Santee Cooper has provided a cost analysis for use of ACI at the proposed Santee Cooper Pee Dee plant. Can Santee Cooper provide a facility to facility cost comparison as to why ACI may be affordable at other utilities (including bituminous) and not at the Pee Dee plant?

  *As a preface to Santee Cooper's response to request, it is important to point out that Santee Cooper's case-by-case MACT application never challenged the "affordability" of ACI as a control technology. Rather, the application evaluated the **cost effectiveness** of ACI as required by the beyond-the-floor statutory factors included in section 112(g) of the Clean Air Act. The low cost effectiveness of ACI, (i.e., minimal additional mercury reductions for considerable additional costs) was such that ACI was rejected as a beyond-the-floor technology for the Pee Dee unit. Although both of these concepts address aspects of cost, "cost effectiveness" and "affordability" are two very distinct concepts and should not be confused.*

As for the cost analyses for other utilities using ACI, Santee Cooper does not have access to such cost data, and Santee Cooper is not aware of any similar well-controlled source that is currently using ACI, nor of any similar source that plans to use ACI.

However, Santee Cooper provides comments on two misleading claims that SELC makes regarding the affordability of ACI. The first claim is that 61 companies have issued contracts for ACI equipment based on an ICAC website, and the second claim is that several plants are either required to install ACI or are already using ACI.

Regarding the ICAC website, ICAC does not and will not release specific information on the facilities listed. Thus, there is no way to verify that the contracts were actually fulfilled. Our reports indicate that many of these ACI projects were never implemented due to the court vacature of the Clean Air Mercury Rule as well as other site-specific reasons. Second, just because a company installs ACI equipment does not mean that that the company will actually use it. As demonstrated in the cost analyses submitted for Pee Dee, the vast majority of annualized costs for an ACI system are ***operating*** *costs, not capital costs; specifically for Pee Dee, the annualized capital costs amount to approximately 5% of the annual cost, while the operating costs account for approximately 95%. The relatively low capital costs are not surprising given that the equipment required to inject ACI is not complicated nor is it extensive. Thus, particularly when building a new facility, a company may choose to include equipment to inject ACI even if they believe there is little chance that it would be used, as the increased capital costs are minor and it is simpler to complete during initial construction. Santee Cooper is aware of one relatively similar source that has purchased ACI injection equipment for a recently permitted site but there is no requirement for that facility to use the technology nor are there definitive plans to use it.*[5]

SELC also makes the unsupported assertion that since ACI has been found affordable at some installations, then it must be found affordable at Pee Dee. If the primary costs associated with ACI were capital costs, SELC's statement could be supportable. However, since the primary costs are operating costs, SELC's statement is without any supportable basis. Santee Cooper does not question that in some situations, ACI can be cost effective. For the Pee Dee unit, however, ACI is not cost effective given the substantial mercury removal achieved by the combination of the design fuel —bituminous coal — SCR, fabric filter, and wet flue gas desulfurization. The most prevalent situation where ACI is affordable is

[5] Louisville Gas & Electric Trimble County Unit 2 included ACI as part of the original construction plans but has no requirement to operate ACI nor was it found to be required as part of the case-by-case MACT analysis. This plant is relatively similar to Pee Dee with the exception that the performance coal is a 70/30 bituminous/subbituminous split. Given the relative difficulty of removing mercury from subbituminous coals without ACI, it is possible that ACI was included to provide mercury control if significant subbituminous coals were combusted.

where it is used for subbituminous or lignite units; where the coal properties result in substantial elemental mercury in the exhaust and there are low levels of acid gases to compete for absorption by the ACI. Of the examples cited by SELC, all but one are subbituminous as shown in the following list.

- ▲ *Comanche – subbituminous (all 3 units)*
- ▲ *San Juan – subbituminous*
- ▲ *Hardin – subbituminous*
- ▲ *Newmont – subbituminous*
- ▲ *Highwood – subbituminous*
- ▲ *Mid-American Council Bluffs - subbituminous*
- ▲ *Dominion Wise – bituminous/waste circulating fluidized bed*

The remaining cited facility with ACI is a circulating fluidized bed (CFB) boiler, where the applicant proposed ACI in the initial case-by-cast MACT permit application. Furthermore, even though Dominion Wise uses bituminous coal, this situation is distinct from Pee Dee due to the CFB design proposed at Dominion Wise. In the CFB, acid gases are naturally removed in the combustion process and thus do not compete with mercury for absorption by ACI. In contrast, in a pulverized coal unit like Pee Dee, the acid gas level is high at the entrance to the fabric filter where ACI would be injected, which in turn requires a substantially higher ACI injection rate than for a stream with low acid gases. Thus, Dominion Wise could achieve mercury removal with a far lower ACI injection rate than Pee Dee. Again, since the ACI material cost is the predominant cost for an ACI system, the differing injection rates are significant.

- **(4)** [Page 30] Please provide information as to the use of the technologies listed on page 30 of the SELC comments.

  The Regenerative Activated Coke Technology (ReACT) process is a multi-pollutant control system that SELC states has reportedly been installed on four coal-fired boilers in Europe and Japan, and that has been evaluated for possible use in the U.S. The U.S. tests were reported at an environmental conference in August 2008.[6] The following information, was extracted primarily from the EPRI presentation provided by SELC, and is relevant to possible use of ReACT at the Pee Dee units:

  - *ReACT has been tested for 3000 hours on a 2.5 MW Slipstream on the Sierra Pacific North Valmy power station in Nevada. The process is expected to reduce SO_2 by 97-99+%, and NOx by 25-48%, and works best on coals with less than 2% sulfur content. During the tests at Valmy, SO_2 reduction was excellent on low concentration SO_2 flue gas (97.6-99.96% reduction), and good on medium concentration (1500 ppm) SO_2 flue gas*

[6] ReACT Process Demonstration at Valmy Generating Station, Paper #123, Power Plant Air Pollutant Control "Mega" Symposium, August 25-28, 2008, Chuck Dene, EPRI, et.al. [SELC Attachment #17].

(93-97% reduction). Tests with higher concentrations of SO_2 were not conducted at the Nevada power plant. Mercury removal was also very good for the coals tested, ranging from 97.0 – 99.6% reduction. $PM_{2.5}$ was reported to be reduced by 83% (to 0.011 #PM2.5/MMBtu).

- *Reduction of other pollutants was not as good, with asbestos reduced by 62%, lead by 49%, magnesium by 2.4%, nickel by 46%. The effectiveness of a fabric filter alone, as reported by DOE's 16 power plant test program, approached 100% for all of these pollutants.*
- *The ReACT system was estimated to cost about 10% more than an SCR/limestone forced oxidation (wet-FGD) system, on a medium sulfur bituminous coal-fired unit.*

Based on the EPRI presentation, ReACT would not qualify as a "stand alone" system for control of SO_2, NOx, and HAPs. Its only possible use at the Pee Dee generating station would be as a supplemental, redundant system. Even without performing a quantitative analysis of the cost-effectiveness of the system and assuming that it could qualify as an available and technically feasible application for the Pee Dee units, it seems apparent from analogous assessments of redundant wet ESPs and redundant fabric filters or dry ESPs, that use of ReACT would roughly double the pollution control cost at Pee Dee, while providing modest emission reduction benefits. The resulting cost-effectiveness values, if calculated, would certainly far exceed those earlier calculated to be prohibitively expensive for other redundant systems. In addition, Santee Cooper could not confidently rely on such an emerging and untested system for compliance purposes prior to seeing it operated for an extended period of time at commercial scale on a range of coals similar to those likely to be used at the Pee Dee unit.

- **(5)** Provide information indicating each of the listed HAPs is invariably present in the surrogate stream to justify the use of that surrogate with the HAP. For example, on page 35 of SELC comments, it was discussed that selenium is emitted in the gas and may not be controlled by the fabric filter. On page 41 SELC comments on various classes of HAPs "that behave differently during combustion."

  *With regard to selenium, the primary distinction between the current version of AP-42 and the passage quoted by SELC in their NOMA comments is the final parenthetic phrase: primarily mercury and, **in some cases**, selenium, which is relevant because SELC takes exception to the inclusion of selenium as a HAP adequately reflected in the choice of a PM-10 surrogate. The probable reason for EPA's ambivalence ("in some cases") regarding selenium can be found in two graphics, published in a DOE report cited by SELC on other issues, and provided below as Figures 2-1 and 2-2.[7] Note that, for the power plants tested, an ESP*

[7] Summary of Air Toxics Emissions Testing At Sixteen Utility Power Plants, Burns and Roe Services Corporation, for USDOE Pittsburgh Energy Technology Center, July 1996.

was effective in capturing only about 55% of selenium emissions (Figure 2-1). However, the units with baghouses (fabric filters) were effective in capturing 80% of selenium emissions. One could speculate that the selenium emissions were adsorbed and captured with particulate matter in much the same manner that (primarily gaseous) mercury emissions are effectively captured by fabric filters (but not ESPs). Alternatively, the fabric filters may be better at capturing selenium because they are more effective at capturing fine particles, and fine particles may contain a significant portion of the selenium emissions. Figure 1.1-1 (From AP-42) and provided below demonstrates that, for 1-2 um diameter particles, a baghouse system has about one-half the emission rate of an ESP system. It is worth noting that the DOE report found that wet scrubbers (which are generally effective in capturing condensable gases) controlled about 30% of selenium from bituminous coal-fired power plants. The unavoidable conclusion from this data is that a fabric filter control system, such as proposed by Santee Cooper for the Pee Dee unit, is likely to capture the vast majority of selenium emissions as particulate matter, far more than will be captured by an ESP system, and at least twice as much as would be captured by a system targeting gaseous emissions (a wet scrubber). Hence, for the Pee Dee control configuration, PM-10 is an optimal surrogate for selenium. SELC also criticizes the use of PM-10 as a surrogate for arsenic, chromium, and nickel emissions (p.37). Note that Figure 2-2 from the DOE report shows that for the units tested by DOE, nearly 100% of the arsenic, chromium, and nickel in coal was captured by fabric filter systems. Hence, PM-10 is the optimal surrogate for these HAPs.

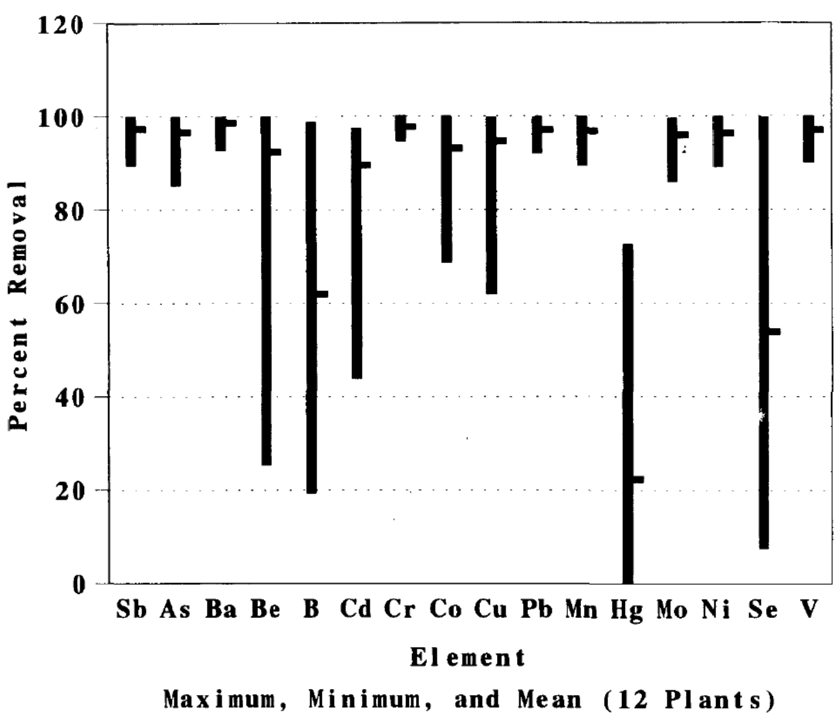

FIGURE 2-1. ESP REMOVAL EFFICIENCIES

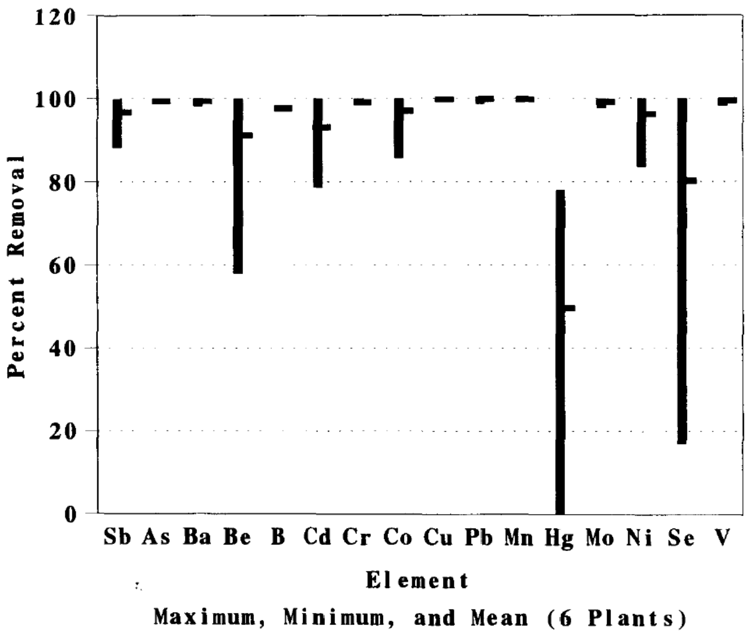

FIGURE 2-2. BAGHOUSE REMOVAL EFFICIENCIES

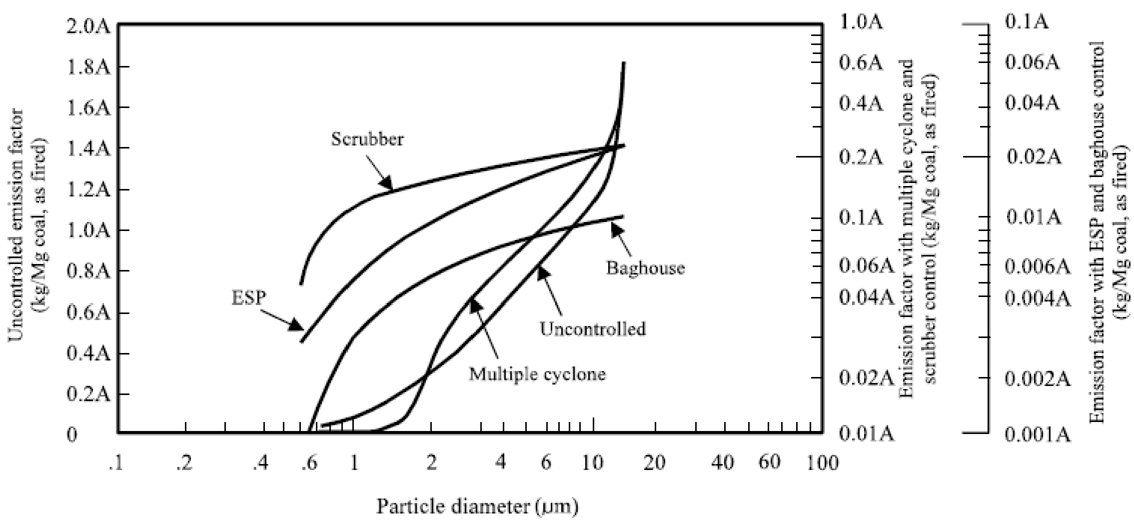

Figure 1.1-1. Cumulative size-specific emission factors for an example dry bottom boiler burning pulverized bituminous coal.

- **(6)** Provide information indicating that the control technology indiscriminately captures HAP along with the surrogate to justify the use of that surrogate with the HAP.

  "Organic HAPs" are called as such because organic chemicals contain carbon. Indeed the term "organic chemistry" is derived from the chemistry of things that are living, and this is universally associated with the presence of carbon. The source of the carbon in organic HAPs that would be emitted by the Pee Dee unit is the carbon in the coal being burned. A primary objective of the plant designer and operating engineer is to oxidize all of the coal carbon to carbon dioxide, as this maximizes the energy extracted from the fuel. If all of the carbon in the coal were converted to carbon dioxide, then there would be no organic HAPs. In other words, organic HAPs are a direct result of incomplete combustion. This incomplete combustion is also the direct cause of emissions of carbon monoxide (CO). Hence, it necessary follows that CO is an excellent surrogate for organic HAPs.

  The use of PM_{10} as a surrogate for metal HAPs is discussed in item 5, and the use of SO_2 as a surrogate for acid gas HAPs is discussed in item 14.

- **(7)** Has Santee Cooper listed each HAP that could be emitted from the proposed process?

  EPA prepared a Report to Congress (RTC) in 1998 regarding HAP emissions from power plants.[8] As part of an emissions testing program for that report, EPA identified that 67 of the 188 HAPs may be emitted from power plants.[9] From that list of 67, EPA identified 13 priority HAPs.[10]

  Santee Cooper used the EPA AP-42 emission factors to identify HAPs potentially emitted from coal-fired power plants, which also resulted in 67 compounds (when including lead - consistent with the RTC). The relevant AP-42 section (1.1, Bituminous and Subbituminous Coal Combustion) was updated in September 1998, after the RTC was issued. With the exception of radionuclides (which is not regulated under section 112 since EPA has never made an affirmative decision to do so for coal-fired power plants), all of the priority HAPs in the RTC are included in the permit application.

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[8] Available for download from http://www.epa.gov/ttn/caaa/t3rc.html.

[9] The RTC treats lead as a HAP. Elemental lead is not a HAP, but lead compounds are.

[10] Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units -- Final Report to Congress, Volume 1. EPA-453/R-98-004a, February 1998. See Table ES-1, page ES-5,

- **(8)** [p. 34] Can Santee Cooper provide any actual test data on non-mercury HAPs from its existing coal-fired units?

  Actual test data from single units provide a snapshot of data. Santee Cooper has provided the SCDHEC BAQ Source Evaluation data with respect to its Cross Generating Station Unit 3 which received a case-by-case MACT determination in the final construction permit issued by the Department in February 2004. The Cross construction permit application included a 112(g) case-by-case MACT with surrogate limits for HAPs. Cross Unit 3 completed initial compliance testing in February 2007. Additional testing for manganese on Unit 3 was completed in October 2008. All test reports for Unit 3 were submitted as required to the SCDHEC BAQ Source Evaluation Department within 30 days of completion. Results for these tests are shown below.

Cross 3 112(g) Test Results		
Pollutant	***Limit (lb/mmBTU)***	***Cross 3 Test Results (lb/mmBTU)***
HCl	*2.4 E-03*	*2.7 E-04*
HF	*3.0 E-04*	*<4.15 E-05*
SO2 (surrogate for acid gases and Hg))	*0.25*	*0.085*
Pb	*1.69 E-05*	*2.22 E-06*
Be	*8.44 E-07*	*3.4 E-08*
Sb	*7.0 E-07*	*<1.4 E-07*
As	*1.6 E-05*	*2.5E-06*
Cd	*2.1 E-06*	*7.5 E-07*
Cr	*1.4 E-05*	*3.5 E-06*
Co	*4.0 E -06*	*2.7 E-07*
Mn	*2.0 E-05*	*4.7 E-05, 7.2 E-06*
Ni	*1.1 E-05*	*6.3 E-06*
Se	*5.2 E-05*	*3.2 E-05*
PM (surrogate for metal HAPs)	*0.015*	*0.006*
Hg	*3.6 E-06*	*7.2 E-07*
CO (proposed surrogate for Pee Dee)	*0.16*	*0.048*
VOCs	*0.0024*	*0.0001*

  (Data with a "<" symbol tested at less than the detection limit. The detection limit is shown to indicate compliance even at the detection limit.)

- **(9)** [p. 35 and other pages] Has Santee Cooper reviewed other coal-fired power plant case-by-case MACT applications or permits to assess whether the surrogate approach is a typical approach? If so, does Santee Cooper have a list of projects where the surrogate approach was considered acceptable?

  *We are not aware of any Case-by-Case MACT permit where surrogates were not used. Santee Cooper has provided a list of publicly available Case-by-Case MACT permits in **SC Attachment 9a (provided in list or table format)** to this response that outline the extensive use of surrogates as a reasonable and appropriate approach to regulating non-mercury metal HAPs, acid gas HAPs, and organic HAPs.*

  Of particular note, DHEC has established a precedent for the use of surrogates, in the same manner as proposed in the Draft Pee Dee Notice of MACT Approval, with the Case-by-Case MACT permit for the Cross Generating Station. Also, in SELC's comments, they refer to the Dominion Wise Case-by-Case MACT permit issued by the Virginia Department of Environmental Quality (DEQ) as an example to follow for setting MACT limits for coal-fired generating units. Notably, Virginia DEQ established PM as a surrogate for non-mercury metal HAP and CO as a surrogate for organic HAP in the Case-by-Case MACT Permit, Registration No. 11526, on June 30, 2008. The Wise permit also relies on the SO_2 limit as a surrogate to assure continuous compliance with the MACT limits set for the acid gases, HCL and HF.

- **(10)** Provide beyond the floor analysis for using a wet ESP for metal HAP surrogate, filterable PM_{10}.

  In the MACT Application, the cost effectiveness of a wet ESP for acid gases was provided in Footnote 92 (page 53). Santee Cooper estimates metal HAP emissions to be 6.88 TPY (Appendix A, MACT application). Based on the cost estimates for the wet ESP listed in the footnote mentioned and assuming one hundred percent removal of the metal HAPs in the wet ESP, the cost effectiveness for the use of a wet ESP to control metal HAPs would be $926,000 per ton.

  Santee Cooper does not believe that a wet ESP is a relevant item to consider specifically for filterable PM_{10}. While a wet ESP can remove filterable PM_{10}, it cannot remove filterable PM_{10} nearly as effectively as the fabric filter proposed for Pee Dee. At 0.012 lb/MMBtu, potential annual PM_{10} filterable emissions are 299.6 tpy. As earlier referenced in the MACT application, amortized annual capital costs alone are $6,371,522. Hypothetically assuming that 100% of the PM_{10} filterable could be removed by the wet ESP, the cost effectiveness would be over $20,000 per ton, which is clearly not cost effective for filterable PM_{10}. Were more detailed cost and removal data be used, the actual cost would be far higher.

- **(11)** [p. 39] Can Santee Cooper provide any data on the concentration ranges of HAP metals occurring in the coal sources that will most likely serve as fuel supplies for the Pee Dee boilers? Related to this question, does Santee Cooper have any comment on the feasibility of selecting fuel supplies to minimize HAP metals content, an approach suggested by SELC in the first paragraph on page 39?

No data is readily available regarding metal HAPs in coal proposed for the Pee Dee facility. The only data readily available for metal HAPs in coal is for mercury. AP-42 values were used to calculate the estimated emissions based on coal. These emissions estimates are listed in Appendix A of the MACT application.

It is not feasible to place HAP metal design constraints on fuel over the next 50 years or to select fuel suppliers by specifying metal HAPs at some maximum concentration. The primary reason for this, as mentioned above, is that no data are readily available to characterize coal HAP content over the range of eastern bituminous fuels Santee Cooper proposes to use. Even if data were available, since the HAP metal content is likely to be variable, coal with the lowest manganese content may not have the lowest lead or other metal HAP. This would have the effect of limiting Santee Cooper's fuel supply to a very small area, which is not the intent of MACT regulations.

- **(12)** Does Santee Cooper have any response to SELC's comments on pages 40-41 about the types of organic HAPs and the inadequacy of CO levels as a surrogate for each of these types?

  Santee Cooper has provided a list of other case-by-case applications that have used surrogates as an appropriate approach; this list is located under the response to question 9(above). Low CO levels are an indicator of complete combustion, which serves to reduce organic HAPs in addition to reducing the creation of polynuclear aromatic hydrocarbons. Polynuclear aromatic hydrocarbons are formed from other hydrocarbons, not products of combustion (CO and CO_2). Referring to the response for question 8 (above), the following chart presents a subset of the data from that response for CO and VOC emissions for Cross 3. As can be seen, both CO and VOC emissions are low, indicating good combustion of organic compounds.

Cross 3 112(g) Test Results		
Pollutant	***Limit (lb/mmBTU)***	***Cross 3 Test Results (lb/mmBTU)***
CO	*0.16*	*0.048*
VOCs	*0.0024*	*0.0001*

- **(13)** [p. 40-42] Can Santee Cooper provide emissions data from its existing coal-fired units showing that "good combustion" indicators (preferably CO, but also CO_2, O_2, or other combustion indicator) correlate well with organic compound emissions? Does Santee Cooper have such data for bituminous coal-fired units operated by other utilities?

  *Santee Cooper supports the SCDHEC NOMA that CO is an adequate surrogate for organic HAPs. Precedents have been indicated in **SC Attachment 13a**. Cross Unit 3 initial compliance data was provided to the Department, but, again, would provide a snapshot of test data and not a basis for a limit. CO data for Cross Unit 1 was submitted via email on November 20, 2008 at the Department's request for 30 days of continuous monitoring data for CO (**SC Attachment 13b and 13c**). Initial testing results for both CO and VOCs at Cross Unit 3 are included under item 8(above).*

  We know of no other continuous data, only stack tests, which represent snapshots of data.

- **(14)** [p. 43] Can Santee Cooper provide any emissions data from its existing coal-fired units showing that SO_2 emissions correlate well with HCl and HF emissions? Does Santee Cooper have such data for bituminous coal-fired units operated by other utilities?

  The table under item 8 contains initial compliance data for Cross Units 3 and includes SO_2, HCl, and HF emissions. The relevant data is reproduced below.

Cross 3 112(g) Test Results		
Pollutant	***Limit (lb/mmBTU)***	***Cross 3 Test Results (lb/mmBTU)***
HCl	*2.4 E-03*	*2.7 E-04*
HF	*3.0 E-04*	*<4.15 E-05*
SO2 (surrogate for acid gases and Hg))	*0.25*	*0.085*

  *Santee Cooper's response to item 9 includes a number of other facilities that have used SO_2 as a surrogate for acid gas emissions. This issue was also discussed in documentation submitted to SC DHEC August 15, 2008. See **SC Attachment 14**.*

- **(15)** [p. 44] Does Santee Cooper have any response to the discussion on page 44 about the "second flaw" in the MACT floor analysis, to the effect that DHEC did not identify actual emissions control levels achieved in practice, but rather calculated emissions limits based on selected control technologies.

  The analysis performed by Santee Cooper in the case-by-case MACT application conforms to the requirements set forth in section 112 of the Clean Air Act and EPA's implementing regulations. Santee Cooper's analysis properly takes into account the BACT technology selected for the Pee Dee unit as well as other *similar sources. Indeed, the Clean Air Act requires when setting the limits for existing sources that EPA consider those facilities that achieve the lowest achievable emission limit (LAER) and exclude those from the floor analysis. See CAA § 112(d)(3)(A), 42 U.S.C. § 7412(d)(3)(A). In addition, EPA's regulations for the case-by-case MACT determination require the permitting authority consider available information for purposes of identifying control technology options for affected sources. The regulations define "available information" as including proposed and draft regulations, supporting background documents for such proposed or draft regulations, data and information available from the Control Technology Center, data and information in the Aerometric Informational Retrieval System including information in the MACT database, and any additional information provided by the applicant or others and any information considered available by the permitting authority. See 40 C.F.R. § 63.41. The RACT/BACT/LAER Clearinghouse is one such acceptable EPA database.[11] Notably, Courts have also upheld the use of permitted limits when setting MACT limits. For example, when upholding EPA's standards for medical waste incinerators, the D.C. Circuit held that if the permit limits reflect the emissions control achieved in practice by the relevant best performers, then the use of permit and regulatory data is permissible as long as it allows a reasonable inference as to the top performing units. See Sierra Club v. EPA, 167 F.3d. 658, 663 (D.C. Cir. 1999). Thus, considering BACT limits included in a new source construction permit for the Pee Dee unit is appropriate and sanctioned by the statute and implementing regulations.*

- **(16)** [p. 50-51] Does Santee Cooper have any comment about the CO test data summarized on pages 50-51 other than that these are data for CFB boilers? Does Santee Cooper have the permitted CO emissions limits for these boilers readily at hand? (If not, DHEC can find them.]

  As discussed in Appendix B of the MACT application, there are fundamental differences in combustion between CFB boilers and PC boilers. These differences include combustion dynamics, operating temperatures, and fuel processing. Based on the data submitted, there are test years missing (2004 for CBA, 2006 for CBB and CBC). Our review indicates that the data has apparently been "cherry picked" for low CO test results. Without corresponding NO_x emissions, it is problematic, at best, to make an assessment; the sources could have been running very close to the NO_x limit to achieve these low CO levels.

[11] The RBLC can be found at the following link: http://cfpub.epa.gov/rblc/htm/bl02.cfm.

- <u>**(17)** [p. 52] Does Santee Cooper have an expected coal chlorine concentration level that represents the "design basis coal chlorine content" in SELC's terminology? Related to this question, can Santee Cooper provide an estimate of the range of coal chlorine concentrations expected for the most likely coals that will serve as fuel for the Pee Dee boilers?</u>

  *Attached is a spreadsheet (**SC Attachment 17a**) regarding recent mercury and chlorine concentrations in coal received at Santee Cooper stations. Chlorine concentrations during this time frame ran between 200 and 1200 ppm. It is important to note that chlorine is a critical coal constituent for controlling mercury from coal-fired electric generating units. Specifically, the chlorine in coal helps to oxidize mercury, allowing mercury to be readily captured in a wet scrubber. Constraining the chlorine concentration in the coal therefore would likely have the counterproductive effect of **increasing** mercury emissions. A discussion on the interaction of chlorine and mercury is included in the attached document. (**SC Attachment 17b)**. Notably, this interaction has been accounted for in the approaches to variability, as submitted to SC DHEC as part of Santee Cooper's 112(g) application (p. 22).*

- <u>**(18)** [p. 53] Does Santee Cooper have an expected coal fluorine concentration level that represents the "design basis coal fluorine content" in SELC's terminology? Related to this question, can Santee Cooper provide an estimate of the range of coal fluorine concentrations expected for the most likely coals that will serve as fuel for the Pee Dee boilers?</u>

  Santee Cooper does not specify a "design basis fluorine content" in its coal specifications.. The estimated HF emissions are based on AP-42 emission factors (AP42 Table 1.1-15). Similar to the discussion in the response to item 11, no data is readily available regarding fluorine concentration in coal proposed for the Pee Dee facility. Since fluorine is in the same family of elements as chlorine, it is likely that fluorine in the coal will also oxidize mercury, allowing mercury to be readily captured in the wet scrubber. Likewise, constraining fluorine content in coal will likely have the counterproductive effect of increasing mercury emissions.

  It is not feasible to place fluorine design constraints on fuel over the next 50 years or to select fuel suppliers by specifying fluorine at some maximum concentration. The primary reason for this, as mentioned above, is that no data are readily available to characterize coal HAP content over the range of eastern bituminous fuels Santee Cooper proposes to use. Even if data were available, since the HAP content is likely to be variable, coal with the lowest fluorine content may not have the lowest lead or other HAP. This would have the effect of limiting Santee Cooper's fuel supply to a very small area, which is not the intent of MACT regulations.

Last paragraph of DHEC request for information:
<u>In addition to the information requested above, we are reviewing the information submitted on the temporary CO monitor at Cross 1. What causes the spikes in CO emissions? What does the data points represent? Is that an averaging of all the readings in an hour or one reading in that hour?</u>

The spreadsheet submitted to DHEC on November 20 via email from Santee Cooper to SCDHEC BAQ in Excel contained minute data from the continuous monitors averaged over the hour. Spikes in data may represent increases or decreases in load, and the variability of the combustion process within the boiler, resulting in changes in operations in order to stabilize load due to conditions affecting combustion, such as moisture, temperatures, fuel characteristics, and fluctuations in changing boiler loads.

See SC Attachments 13a - 13c.